EXHIBIT G

From: Felicia Rosario <felicia.rosario@gmail.com>
Sent: Sunday, September 9, 2018 11:25 AM
To: Larry Ray
Subject: Human Hippocampal Neurogenesis Persists throughout Aging: Cell Stem Cell

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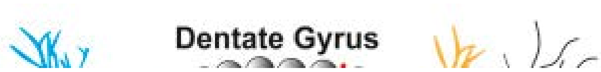
Human Hippocampal Neurogenesis Persists throughout Aging



Highlights

- Pools of quiescent stem cells are smaller in aged human hippocampal dentate gyri
- Proliferating progenitor and immature neuron pools are stable with aging
- Angiogenesis and neuroplasticity decline in older humans
- Granule neurons, glia, and dentate gryus volume are unchanged with aging

Summary

Adult hippocampal neurogenesis declines in aging rodents and primates. Aging humans are thought to exhibit waning neurogenesis and exercise-induced angiogenesis, with a resulting volumetric decrease in the neurogenic hippocampal dentate gyrus (DG) region, although concurrent changes in these parameters are not well studied. Here we assessed whole autopsy hippocampi from healthy human individuals ranging from 14 to 79 years of age. We found similar numbers of intermediate neural progenitors and thousands of immature neurons in the DG, comparable numbers of glia and mature granule neurons, and equivalent DG volume across ages. Nevertheless, older individuals have less angiogenesis and neuroplasticity and a smaller quiescent progenitor pool in anterior-mid DG, with no changes in posterior DG. Thus, healthy older subjects without cognitive impairment, neuropsychiatric disease, or treatment display preserved neurogenesis. It is possible that ongoing hippocampal neurogenesis sustains human-specific cognitive function throughout life and that declines may be linked to compromised cognitive-emotional resilience.

Graphical Abstract

Adult hippocampal neurogenesis declines in aging rodents and primates. Aging humans are thought to exhibit waning neurogenesis and exercise-induced angiogenesis, with a resulting volumetric decrease in the neurogenic hippocampal dentate gyrus (DG) region, although concurrent changes in these parameters are not well studied. Here we assessed whole autopsy hippocampi from healthy human individuals ranging from 14 to 79 years of age. We found similar numbers of intermediate neural progenitors and thousands of immature neurons in the DG, comparable numbers of glia and mature granule neurons, and equivalent DG volume across ages. Nevertheless, older individuals have less angiogenesis and neuroplasticity and a smaller quiescent progenitor pool in anterior-mid DG, with no changes in posterior DG. Thus, healthy older subjects without cognitive impairment, neuropsychiatric disease, or treatment display preserved neurogenesis. It is possible that ongoing hippocampal neurogenesis sustains human-specific cognitive function throughout life and that declines may be linked to compromised cognitive-emotional resilience.

Graphical Abstract

Keywords

- dentate gyrus
- Sox2
- nestin
- Ki-67
- PSA-NCAM
- NeuN
- doublecortin
- granule cells
- neural progenitor
- volume

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